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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/832,272	04/10/2001	Kirk Prall	3969.3US (95-0310.3)	2827

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EXAMINER
WARREN, MATTHEW E

ART UNIT	PAPER NUMBER
2815	

DATE MAILED: 07/15/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Offic Action Summary	Application No. 09/832,272	Applicant(s) PRALL ET AL.	
	Examiner Matthew E. Warren	Art Unit 2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 May 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-42* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-52* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

This Office Action is in response to the RCE and Amendment filed on May 27, 2003.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-52 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The added limitations concerning the aspect ratio being 2.5 or 5:1 are not supported by the specification.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-52, as far as understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki et al. (US 5,629,539) in view of Iacoponi (US 5,545,592).

Aoki et al. shows (fig. 1b) a dynamic random access memory array (DRAM) comprising a substrate (10), a plurality of memory cells, each cell having field effect access transistors and a stacked capacitor (21b, 27, and 28). The field effect transistors have source/drain regions (15b) that function as storage node junctions and are connected to the capacitor of the memory cell. The transistors also have second source/drain regions (15a) which functions as an access node junction and an insulated gate (13) overlying the substrate. The gate is insulated from the substrate by a gate dielectric (12) of silicon oxide and has vertical sidewalls (16) and an upper surface which are both covered by a dielectric of nitride (14). The gate electrode (13) comprises doped polysilicon. Along the length of the substrate, other access transistors are insulated from the substrate by a field oxide region (11). An interlevel dielectric layer (31) comprising a second dielectric material is blanketed over the substrate to a level above the capacitors. A plurality of digit line contact openings (having 21a and 24a) penetrate the interlevel dielectric layer and terminate at an access node junction (15a). The contact opening is self-aligned with the first dielectric material of the sidewall insulation of the gate because the contact is adjacent to the gate. The contact opening may be filled with a layered structure including tungsten and titanium (col. 8, lines 40-46) A digit line (33) is formed on top of the interlevel dielectric layer and makes electrical contact to the tungsten plug. Aoki shows all of the elements of the claims except the digit line contact opening having the specific titanium and CVD TiN and tungsten layer formed on the access node junction. Iacoponi shows (figs. 7) a contact structure comprising a contact opening formed in an interlayer dielectric layer (130). An access

node junction (in silicon material 100) has a layer of titanium silicide (120) formed on it. A layer of titanium (150) is formed on the sidewalls of the opening. A CVD titanium nitride layer (160) and CVD tungsten (170) are subsequently deposited to fill the openings (col. 1, line 60 - col. 2, line 4). The silicide layer is formed by reacting the titanium with the source/drain region (col.1, lines 32-34). As can be seen from the figure, the titanium layer is overlying the silicide layer by does not make contact with the tungsten layer. The titanium/titanium nitride combination in conjunction with the silicide layer provides a low resistance electrical contact while the TiN provides a diffusion barrier for the underlying Ti layer and an adhesion promoter for the W layer (col. 1, lines 57 – col. 2, line 4). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the contact opening of Aoki by adding a titanium metal layer and silicide to the access node junction of a transistor because Iacoponi teaches that such a configuration provides a low resistance electrical connection and adhesion promotion of tungsten.

With respect to the limitations of the CVD (chemical vapor deposited) titanium and tungsten and the reaction of titanium with silicon to form silicide, a "product by process" claim is directed to the product per se, no matter how actually made, In re Hirao, **190 USPQ 15 at 17**(footnote 3). See also in re Brown, **173 USPQ 685**: In re Luck, **177 USPQ 523**; In re Fessmann, **180 USPQ 324**: In re Avery, **186 USPQ 116** in re Wertheim, **191 USPQ 90** (**209 USPQ 254** does not deal with this issue); and In re Marosi et al, **218 USPQ 289** final product per se which must be determined in a "product by, all of" claim, and not the patentability of the process, and that an old or

obvious product, whether claimed in "product by process" claims or not. Note that Applicant has the burden of proof in such cases, as the above case law makes clear. "Even though product-by- process claims are limited by and defined by the process, determination of patentability is based upon the product itself. The patentability of a product does not depend on its method of production. If the product in product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product is made by a different process." In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985)(citations omitted).

Response to Arguments

Applicant's arguments filed with respect to claims 1-42 have been fully considered but they are not persuasive. The applicant still asserts that Aoki cannot combined with Iacoponi but this time argues that Aoki teaches away from the combination because Aoki uses a simplified process. The examiner believes that the cited references show all of the elements of the claims despite the differences in process between the two inventions. Although Aoki uses a simplified process to form the device, one could still would still recognize the benefits of Iacoponi's CVD process (provide adhesion promotion of tungsten). If one were to look for an improved contact structure, Iacoponi would be relied upon to teach such an improvement. The combination may provide additional steps to Aoki, but with respect to device claims, Aoki does not teach away from the combination. If Aoki were to teach away from the CVD TiN and tungsten then Aoki would flat out state that the material provides

disadvantages and would not be used. Aoki does not reject the use of CVD TiN and tungsten and tungsten and thus does not teach away from such a device combination. Of course, when dealing with the combination of references for semiconductor devices, the process for both references may differ, but that does not automatically mean that those device components cannot be combined. Therefore the combination of references is proper and they show all of the elements of the claims.

With respect to the arguments that the references do not disclose the aspect ratio, the applicant's specification does not explicitly disclose that ratio in paragraphs [0006 to 0009] or any other parts thereafter. Even if such a limitation were supported by the spec, the combined inventions of Aoki and Iacoponi disclose all of the elements of the claims, have the same structure and materials as the instant invention, and thus inherently form a device having the desired aspect ratio. As stated in the arguments, the CVD TiN allows for the formation of a higher aspect ratio. Since Iacoponi also uses a CVD process, a higher aspect ratio can also be achieved.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew E. Warren whose telephone number is (703) 305-0760. The examiner can normally be reached on Mon-Thurs, and alternating Fri, 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703) 308-1690. The fax phone numbers for

the organization where this application or proceeding is assigned are (703) 305-3432 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

MEW
July 10, 2003

EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800